

**EPA Superfund  
Record of Decision:**

**J & L LANDFILL  
EPA ID: MID980609440  
OU 02  
ROCHESTER HILLS, MI  
09/30/1997**

## **DECLARATION FOR THE RECORD OF DECISION**

### **SITE NAME AND LOCATION**

**Jones & Laughlin Landfill, Rochester Hills, Oakland County, Avon Township, Michigan**

### **STATEMENT OF BASIS AND PURPOSE**

This decision document presents the selected remedial action for the Jones & Laughlin Landfill (JLLF), in Rochester Hills, Michigan, which was chosen in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1996 (SARA), and, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This Record of Decisions (ROD) is for the groundwater operable unit (OU2) remedial action. The landfill has already been addressed as OU1 in a separate ROD, dated June 30, 1994.

The State of Michigan does not concur with the selected remedy.

### **ASSESSMENT OF THE SITE**

Actual or threatened releases of hazardous substances from this site, if not addressed by implementing the response action in this ROD, may pose an imminent and substantial endangerment to the public health, welfare, or the environment.

### **DESCRIPTION OF THE SELECTED REMEDY**

The purpose of this remedy is to eliminate the groundwater exposure pathway for potential human receptors. The selected remedy for OU2 consists of implementing groundwater use restrictions, installing monitoring wells, and performing periodic groundwater monitoring. Other components of the selected remedy include:

- Requirements to implement enforceable deed restrictions which restrict groundwater use at that portion of the facility where contaminated groundwater from JLLF has come to be located under Sandfill Landfill #22, in addition to the deed restriction currently in place on the JLLF property;
- Installing three monitoring well nests, one upgradient and two downgradient, with each nest consisting of a shallow and a deep well;
- Perform baseline quarterly groundwater monitoring and subsequent annual groundwater monitoring, if deemed appropriate, of COCs at residential wells and at on-site and off-site monitoring wells. As a contingency, if these downgradient wells indicate that there is an unacceptable risk due to contamination from the JLLF site, residences will be provided with an alternate water supply.

### **STATUTORY DETERMINATIONS**

The selected remedial action is protective of human health and the environment, complies with federal and state requirements that are legally applicable or relevant and appropriate to the remedial action, and is cost effective. The selected remedial action constitutes a final groundwater remedy under CERCLA and complies with the requirements of Part 201 of the Michigan Natural Resources and Environmental Protection Act 1994 PA 451, as amended. The statutory preference for remedies that reduce the toxicity, mobility, or volume as a principal element is not achieved with this action. However, unless or until indications that groundwater degradation attributable to the JLLF site is occurring and contamination threatens private water supplies, extensions of the municipal water supply system is not supportable.

U.S. EPA has determined that its response at this site is complete. Therefore, the site now qualifies for inclusion on the Construction Completion List.

This remedial action will result in potentially hazardous substances remaining on site above health-based levels. A review will be conducted within five years after commencements of the remedial alternative implementation. This will ensure that the remedy continues to provide adequate protection of human health and the environment.

<IMG SRC 97113A>

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## **DECISION SUMMARY**

### **J&L Landfill**

#### **I. SITE NAME, LOCATION, AND DESCRIPTION**

The Jones and Laughlin Landfill (JLLF) Superfund site is located on Hamlin Road in Rochester Hills, Michigan (Figure 1). The area surrounding and including the JLLF is generally level, with the exception of a drainage ditch along the eastern boundary, Ladd Drain near northern boundary, the south ditch along Hamlin Road, and a sediment pond in the northwestern corner of the site (Figure 2). The pond has been subsequently filled in and capped as a result of the Operable Unit One (OU1) Remedial Action. Vegetation covers most of the site except in scattered patches and roadways.

Land use in the vicinity of the JLLF includes residential, industrial, recreational, other landfill, and mining facilities. The JLLF is bordered on the east and north by Sandfill Landfill No. 2, and on the west by Sandfill Landfill No. 1. There are at least six other landfills within one-half mile of the site. Residential areas exist within 500 feet of the southern property boundary, approximately 1,000 feet northwest of the site, and approximately 600 feet west of the site along Hamlin Road. The JLLF and adjacent properties are zoned light industrial.

The Clinton River is located less than one mile east of the JLLF, and flows from northwest to southeast through the Rochester-Utica State Recreation Area. Ladd drain, which is located on the northern boundary of the site, drains into the Clinton River. Surface water drainage from the area flows primarily to the north and east toward the Clinton River. Groundwater flow direction, similarly, is towards the north and east.

#### **II. SITE HISTORY AND ENFORCEMENT ACTIVITIES**

##### **A. Site History**

Steel slag and steel manufacturing wastes were the primary wastes disposed at the site, which was a former sand and gravel borrow area. During 1967 or 1968, baghouse dust filters were installed on the electric arc furnaces at the J&L Steel, Warren, Michigan facility. The dust collected by these filters, referred to as electric arc furnace (EAF) dust, was thereafter co-disposed of with slag at the JLLF. This EAF dust, if classified today, would be considered a listed hazardous waste under the Resource Conservation and Recovery Act (RCRA). Disposal operations at the JLLF may have started as early as 1951, and were terminated in 1980 when the site was closed and a cap was installed.

By November of 1980, the JLLF had been brought up to grade, as specified by Avon Township/Rochester Hills, and covered with a landfill cap. This cap appeared to have been mixed with slag materials, and was dotted with areas void of vegetation and scattered with debris. After investigation, a new cap is being constructed in accordance with the specifications stipulated in the ROD for OU1. A prefinal inspection was conducted on September 29, 1997. Construction of the cap was determined to be substantially complete.

##### **B. Past Studies**

In 1976, the Michigan Department of Natural Resources (MDNR) conducted an area-wide groundwater study and identified an area of groundwater contamination primarily attributed to a landfill west of the JLLF. As a result, local residents were provided with an alternative drinking water supply. This study also determined that although the area-wide groundwater contamination problem was attributable to many possible sources, the JLLF was probably contributing as well.

U.S. EPA region 5 files indicate that the J&L Steel company submitted a CERCLA notification in June 1981, claiming ownership of the subject property for which it reported disposal of 55,555 cubic yards of steel slag from 1966 to 1980. Ecology and Environment, Inc. (E&E), completed a Preliminary Site Assessment in July, 1983, followed by a Site Inspection in June, 1984 to verify the site location and ownership. The Hazard Ranking System (HRS) scoring was completed by an E&E Field Investigation Team (FIT) in July, 1985, with an HRS score of 31.65 based on the site's potential for groundwater contamination. The site was proposed for

addition to the Nation Priorities List (NPL) in the June 10, 1986 Federal Register (volume 51, Number 111, pages 21099-21108).

A comprehensive field investigation was conducted during the Remedial Investigation (RI) in order to determine the nature and extent of contamination at the JLLF. This investigation included geophysical study, waste characterization borings followed by waste sampling and analysis, surface soil sampling, surface water sampling, sediment sampling, groundwater monitoring well installation and sampling, and residential well sampling. Results of the RI are detailed in the RI report (December 1991). Based on the results of the RI and previous investigation, the U.S. EPA divided the site into two sections called Operable Units (OUs). Operable Unit 1 (OU1) consists of the landfill and its contents. Operable Unit 2 (OU2) consists of the groundwater.

The Site Focused Feasibility Study (FFS) for OU1 was completed in January 1994. The FFS documents in detail the development and evaluation of several remedial action alternatives for the landfill operable unit at JLLF. The ROD, which selected a remedy consisting of a 1-foot compacted clay overlain by geosynthetic clay liner/60 mil flexible membrane liner barrier layer, a drainage layer of geonet with geotextile filter fabric, a 36-inch clean fill layer, and a 60-inch topsoil layer, was issued in June of 1994. Construction in accordance with the remedy for OU1 began in the summer of 1996. A prefinal inspection was conducted on September 29, 1997. Construction of the cap was determined to be substantially complete.

Additional testing has been performed to determine an appropriate remedy for OU2. GeoProbe sampling was completed in June, 1996. The results are summarized in a technical memorandum issued on September 30, 1996. The Focused Feasibility Study for OU2 was completed in August, 1997, and outlines four alternatives for addressing the operable unit.

### **III. HIGHLIGHTS OF COMMUNITY PARTICIPATION**

An RI fact was released by the U.S. EPA in July of 1990, followed by a public meeting on August 6, 1990, to inform the local residents of the superfund process and the work to be conducted during the RI. In February, 1992, the U.S. EPA issued a second letter to the public to inform them of the upcoming RI public meeting on March 12, 1992, where the results of this study were discussed.

Information repositories have been established at the Rochester Hills Public Library, 500 Olde Towne Road, Rochester Hills, Michigan. In accordance with Section (113)(k)(1) of CERCLA, the Administrative Record is available to the public at these locations, as well as the U.S. EPA Region 5 office in Chicago, Illinois.

The Proposed Plan for OU1 was available for public comment from January 25, 1994 to March 26, 1994 through the release of a fact sheet. A public meeting was held on February 9, 1994 to present the Proposed Plan and U.S. EPA's recommended alternative for OU1 at the JLLF. At the public meeting, U.S. EPA and the Michigan Department of Natural Resources (MDNR) answered questions about the site and the remedial alternatives under construction. Formal oral comments on the Proposed Plan were documented by a court reporter. A verbatim transcript of this public meeting has been placed in the information repositories and the Administrative Record. Written comments were also accepted at this meeting.

Advertisements announcing the availability of the Proposed Plan for OU1 and the start of the comment period were published in the Oakland Press on January 17, 1994. Post cards were also sent out to parties on U.S. EPA's mailing list to announce the extension. Oral and written comments received during the above mentioned Public Comment period and the U.S. EPA's responses are included in the Responsiveness Summary of the ROD for OU1.

Advertisements announcing the availability of the Proposed Plan for OU2 and the start of the comment period were published in the Detroit Free Press on August 17, 1997 and in the Rochester Hills Eccentric on August 24, 1997. The Proposed Plan for OU1 was issued in August 1997, and was available for public comment from August 18, 1997 through September 17, 1997.

A public meeting was held in the Town Hall of Rochester Hills on August 26 to present the Proposed Plan and U.S. EPA and the Michigan Department of Environmental Quality (MDEQ, formerly MDNR) answered questions about

the site and the remedial alternatives under consideration. Formal oral comments on the Proposed Plan were documented by a court reporter. A verbatim transcript of this public meeting has been placed in the information repositories and the Administrative Record. Written comments were also accepted at this meeting.

The public participation requirements of CERCLA Sections 113(k)(2)(B)(I-v) have been met in the remedy selection process for OU2 at JLLF. This decision document presents the selected remedial action for the JLLF chosen in accordance with CERCLA, as amended by SARA and, to the extent practicable, the NCP. The decision for this site is based on the Administrative Record.

#### **IV. SCOPE OF THE SELECTED REMEDY**

This ROD addresses the final remedy for groundwater (OU2) at the JLLF under CERCLA. The threat posed by the site to human health and the environment is the potential for unacceptable concentrations of contaminants found in the groundwater in on-site monitoring wells (contaminants from the JLLF site) to migrate downward and horizontally in the direction of groundwater flow, ultimately degrading the groundwater quality in the off-site private drinking water wells. Based on the investigation conducted, a number of potential sources for groundwater contamination exist within the direct vicinity of the JLLF site. Groundwater data shows widespread impact by metals, namely Aluminum, Iron, Manganese and Sodium. Concentrations exist upgradient to the JLLF site at levels comparable to down gradient data.

Based on groundwater monitoring data and GeoProbe data, the concentrations of those organic constituents detected in the downgradient groundwater did not exceed their respective cleanup criteria. In general, the inorganic constituents aluminum, iron, and manganese seemed to be present on a regional basis at concentrations that exceeded their generic cleanup criteria.

However, to provide an additional level of assurance, it has been determined that the private water supply wells and selected site monitoring wells should be sampled periodically for thirty years for indications of groundwater degradation. If this is detected as defined in the contingency plan, the contingent remedy to provide alternate water supply will be implemented. The trigger mechanisms for the contingency are further defined in section XIV of this Record of Decision.

#### **V. SUMMARY OF CURRENT SITE CONDITIONS**

The RI performed at the JLLF was designed to characterize the nature and extent of contamination posed by the landfilled materials at the site, and to conduct a human health risk assessment and environmental assessment. The RI included sampling and analysis of groundwater, surface water, sediments of the surrounding ditches and pond, surface soil, subsurface soil (waste borings), and residential wells. In addition to chemical analysis, waste boring samples were collected and tested for their leaching potential (also known as Extraction Procedure (EP) toxicity).

Based on the results of the RI, U.S. EPA had determined that current risks posed at the JLLF include direct contact with sediments contaminated with polycyclic aromatic hydrocarbons (PAHs) and inhalation of surface soils containing chromium and other heavy metals. Surface samples along the side slopes of the east ditch, sediment pond, and Ladd Drain also contain low levels of volatile organic compounds (VOCs) and semivolatile organic compounds (SVOCs), in addition to the heavy metals previously mentioned. In addition, waste boring samples analyzed for leaching characteristics showed that selenium in one sample and lead in another, had the potential to leach into the groundwater. Other heavy metals, including nickel and zinc, were found to have leaching potentials, but do not have established EP toxicity maximum allowable concentrations. As a consequence of this risk finding, U.S. EPA signed a ROD to address the elements of the above mentioned risk the remedial action of which has been completed this fall. Specific information related to the construction of the first OU can be found in section VIII of this ROD. U.S. EPA also determined, through the RI results, that a threat to human health and the environment is posed through future residential exposure upon ingestion of groundwater directly beneath the site contaminated with arsenic, and through direct contact with sediments contaminated with heavy metals and PAHs, which is the focus of this Record of Decision.

In addition, arsenic was also found in a saturated area of general refuse currently below the water table;

however, data indicates that the arsenic is not currently mobile and has not migrated off the JLLF site.

#### A. Topography

The JLLF is on the surface of a glacio-lacustrine delta which slopes to the southeast at a relatively shallow gradient. The delta is comprised of approximately 35 to 40 feet of sand and gravel deposits which have been extensively mined throughout the area. Underlying the sand and gravel deposits are thick lacustrine and morainal silty clay deposits, followed by bedrock composed primarily of shales.

#### B. Geology

Three stratigraphic units consisting of landfill materials, deltaic sand and gravel, and clay materials were encountered during drilling at the site. Landfill materials are further divided into clay materials and waste fill material. Waste material encountered consists of slag from 2 to 18.5 feet thick and general refuse from 3.25 to 22.5 feet thick. In some areas, the two waste materials are mixed. EAF dust was not directly observed in discrete quantities, but may have been encountered as very fine-grained material mixed within general slag material. Sand and gravel deposits ranging from 7.5 to 25 feet thick and silty clay directly underlie the landfill materials.

#### C. Hydrology

An unconfined water table aquifer extends into JLLF waste materials. Monitoring wells installed at on-and off-site locations indicate that groundwater flow in the upper and lower portions of the aquifer is eastward, and that the water table elevations fluctuate seasonally. Slug tests performed on all on-site monitoring wells indicate that the mean hydraulic conductivities for the upper and lower portions of the aquifer are  $8.14 \times 10^{-3}$  cm/sec, and  $1.43 \times 10^{-3}$  cm/sec, respectively. This data indicates that the upper portion of the aquifer is more permeable and more conducive to contaminant transport than the lower portion of the aquifer. This is also reflected in the finer material grain size and the decrease in moisture content observed with depth. The mean groundwater flow velocity for the upper portion of the aquifer is approximately 175 ft/year, and is approximately 15 ft/year for the lower portion. Laboratory permeability tests performed on silty clay and clayey silt materials at the base of the shallow aquifer ranged from  $5.5 \times 10^{-7}$  to  $6.6 \times 10^{-7}$  cm/sec, indicating that the materials are capable of retarding, but not preventing, vertical migration of groundwater.

Surface water flow rates were measured during both dry and wet weather conditions at various locations upstream, adjacent to, and downstream of the JLLF in Ladd Drain and the east ditch, and in the on-site sediment pond. Based on the depth of the pond, surface water elevation, and groundwater elevations in nearby wells, it is probable that the sediment pond acts as a localized groundwater discharge zone. The sediment pond contains water that flows actively through the pond in a west-to-east direction via inlet and outlet culverts.

#### D. Contamination Source

The source of contamination at the JLLF is the landfilled waste, which is comprised of steel slag, steel manufacturing waste intermixed with EAF dust, and general refuse. The estimated volume of waste contained within the landfill is approximately 455,000 cubic yards, of which approximately 65% (295,750 cubic yards) consists of steel manufacturing waste (slag intermixed with EAF dust), and approximately 35% (159,250 cubic yards) consists of general refuse. Section VIII of this ROD contains the specifics on how this source was addressed through operable unit one.

### VI. SUMMARY OF REMEDIAL INVESTIGATION RESULTS

The Remedial Investigation was conducted during the summer of 1990, with additional sampling conducted in January 1991. The scope of work for the investigation included the following:

sampling and analysis of waste material, natural soil and surface soil, surface water and sediment, residential water wells, and groundwater. A geophysical survey was also performed.

Results of the sampling indicate that the landfill contents are composed of clay materials consisting of silty clay, clayey silt, sand, and waste fill material. Clay materials comprised the existing landfill cap and solid fill in areas that were devoid of waste presumably to bring the landfill up to the surrounding surface grade. (That cap is currently being replaced as part of the remedial action for OUL.) Waste material encountered consists of slag from 2 to 18.5 feet thick, and general refuse from 3.25 to 22.5 feet thick. In some areas the two waste materials are mixed. There is also the possibility that EAF dust is mixed with some of the waste, although the data collected to date does not confirm this.

The hydrogeological investigation indicated that the groundwater flow is from west to east. The water table surface was found at approximately 13 to 16 feet below ground surface in the central portions of the landfill. These elevations correspond to levels within the landfill waste.

Results of the waste boring sample indicate that VOCs and SVOCs are predominantly associated with general refuse, while inorganics (metals) are the primary constituents present in the slag material. However, in an analysis performed by J&L Steel in 1980 of EAF dust collected from the J&L Plant in Warrenville, Michigan, 2.1 weight percent of the EAF dust sample was found to be composed of volatile solids/soils. Also, two waste boring samples collected from the area of general refuse showed that EP toxicity values for selenium in one sample, and lead in the other sample, exceeded the maximum concentrations of contaminants characteristic of EP toxicity, as cited in Code of Federal Regulations (40 CFR 261.24). For this reason, the general refuse material, at least at the two locations, can be considered hazardous based on the leachability of lead and selenium. Eight waste boring samples were also collected and analyzed from the slag and steel waste materials. Although these results indicate that EP toxicity metal concentrations were very low and not above standards, there is the potential for low levels of selenium, lead, chromium, nickel, and zinc to leach into the groundwater from the slag and steel wastes under the right conditions.

In other analyses, the slag material exhibited elevated concentrations of antimony, arsenic, calcium, chromium, cobalt, iron, magnesium, manganese, nickel, silver, thallium, and zinc. Of these 12 inorganics, calcium, chromium, magnesium, manganese, nickel, and zinc were also reported as components in the EAF dust analysis conducted by J&L in 1980. This indicates the probable presence of EAF dust in the samples, although discrete quantities of the material were not specifically observed during RI sampling.

Surface soil sampling results also indicate that low levels of organic compounds including toluene, acetone, benzo(b)fluoranthene, benzo(a)pyrene and fluoranthene are present on the side slopes of the east ditch, on-site sediment pond, and Ladd Drain. High levels of inorganic chemicals were detected in the southwest and northeast areas of the site devoid of vegetation.

The presence of these contaminants, in addition to groundwater sampling results, indicate that the landfill may be a source of groundwater contamination.

Groundwater sampling results, from wells located on the JLLF site, indicate that VOCs, SVOCs, pesticides, and inorganic chemicals are present in the groundwater directly beneath the site. The VOC contaminants found included acetone, 2-butanone, benzene, toluene, ethylbenzene, and total xylenes. The Maximum Contaminant Levels (MCLs) for total xylenes, ethylbenzene, and benzene were exceeded. The MCL for arsenic was also exceeded in groundwater underlying an area of saturated general refuse within the JLLF. Although the detected VOCs in groundwater beneath the site assisted in driving the future risk to human health and the environment up to the calculated levels, groundwater in both the upper and lower portions of the aquifer was also found to contain some VOCs as it entered the J&L site. Thus, the JLLF appears to be contributing to the area groundwater contamination, most likely through the areas of general refuse where the majority of VOCs and the highest concentrations were detected. The residential wells that were sampled downgradient of the site were found to be free of contamination originating from the site.

## **VII. SUMMARY OF GEOPROBE SAMPLING RESULTS**

The results of the four rounds of groundwater sampling conducted during the RI suggested that several constituents detected in the groundwater may be resulting from potential sources upgradient from the JLLF site. Therefore, additional groundwater sampling was conducted utilizing a GeoProbe sampling device in June 1996 to characterize groundwater quality in areas immediately upgradient and downgradient of the JLLF. The

procedures and results of the GeoProbe sampling are described in "Technical Memorandum Documenting the Results of GeoProbe Sampling", dated 30 September, 1996. The results are summarized below.

The GeoProbe groundwater samples were collected from the following four area: the area upgradient of the Sandfill Landfill No. 1 (samples GP01, GP06, GP07, and GP08), the area within the boundaries of the Sandfill Landfill No. 1 (sample GP03), the area within the boundaries of the Sandfill Landfill No. 2 (samples GP09 and GP10), and the area downgradient of the Sandfill Landfill No. 2 (samples GP11 and GP12). Sandfill Landfill No. 1 is upgradient of the JLLF, and Sandfill Landfill No. 2 is downgradient of the JLLF. Figure VII-1 shows the locations of the landfills in the area and the locations where the GeoProbe samples were collected.

Each sample was analyzed for Routine Analytical Services (RAS) Target Analyte List (TAL) inorganics and Target Compound List (TCL) organic parameters (except GP12, which was analyzed only for TCL VOCs because of insufficient sample volume). The constituents detected

in the GeoProbe groundwater samples were compared to the MDEQ generic groundwater cleanup criteria. The following exceedances were noted:

- Aluminum, iron, lead, manganese, sodium and thallium exceeded the MDEQ generic cleanup criteria in some of the samples upgradient of the Sandfill Landfill No. 1. However, VOCs and SVOCs did not exceed the MDEQ generic cleanup criteria in the samples upgradient of the Sandfill Landfill No. 1.
- Acetone, 4-methyl-2-pentanone, 4-methylphenol, naphthalene, aluminum, antimony, cadmium, chromium, cobalt, iron, lead, magnesium, manganese, nickel and sodium exceeded the MDEQ generic cleanup criteria in the sample within the boundaries of Sandfill Landfill No. 1.
- Benzene, aluminum, barium, iron, lead, manganese, and sodium exceeded the MDEQ generic cleanup criteria in some of the samples within the boundaries of the Sandfill Landfill No. 2.
- Aluminum, iron, and manganese exceeded the MDEQ generic cleanup criteria in some of the samples downgradient of the Sandfill Landfill No. 2. However, VOCs and SSVOCs did not exceed the MDEQ generic cleanup criteria in the samples downgradient of the Sandfill Landfill No. 2.
- Pesticides did not exceed the MDEQ generic cleanup criteria in any GeoProbe samples.

The following conclusions were reached based on a comparison of the results of the GeoProbe sampling effort with the results obtained from the four rounds of sampling of the monitoring wells located within the boundaries of the JLLF:

- The shallow groundwater upgradient of the Sandfill Landfill No. 1 had a fewer number of VOCs, SVOCs, inorganics, and pesticides than the groundwater at the JLLF. In addition, those constituents that were detected in the upgradient shallow groundwater were detected at lower concentrations than in the groundwater at the JLLF.
- The shallow groundwater within the boundaries of the Sandfill Landfill No. 1 had many of the same constituents that were found in the groundwater at the JLLF site; however, the concentrations of these constituents were typically higher at the Sandfill Landfill No. 1 than they were at the JLLF. The one exception was benzene, which was detected in the shallow groundwater at the Sandfill Landfill No. 1 at a lower concentration than was detected in the groundwater at the JLLF.
- Significantly fewer organic constituents were detected in the shallow groundwater from the area that is downgradient of the Sandfill Landfill No. 2. The concentrations of those organic constituents detected in the downgradient groundwater to Sandfill Landfill #2 did not exceed their respective cleanup criteria.
- In general, the inorganic constituents aluminum, iron, and manganese seemed to be present in the local area at concentrations that exceeded their respective generic cleanup criteria.

Thus, several constituents detected in the groundwater beneath the JLLF site may be resulting from potential sources upgradient of the JLLF site. The inorganic constituents aluminum, iron, and manganese appear to be present on the local level at concentrations that exceed their MDEQ generic cleanup criteria. The existing shallow groundwater data indicates that the organic constituents do not exceed the MDEQ generic cleanup criteria downgradient of the area landfills.

#### **VIII. CURRENT CONSTRUCTION ACTIVITIES AT THE JLLF**

Construction at the landfill as part of the remedy for OU1 is nearing completion, and will result in a reduction in the potential for migration of contaminants to the groundwater. The remedy consists of a 1-foot compacted clay layer overlain with a Geosynthetic Clay Liner (GCL/60 mil Flexible Membrane Liner (FML) barrier layer, a drainage layer consisting of geonet with geotextile filter fabric, a 36-inch clean fill layer, and a 6-inch topsoil layer; consolidation of the contaminated beneath the site. In addition, a proper slope will be constructed and maintained so that all surface water runoff properly drains off the cap into a collection system, or drainage ditches around the perimeter of the site. Other components of this remedy include:

- Abandoning (plugging) the sediment pond culverts, consolidating any contaminated soils/sediments beneath the existing landfill cap and back filling the sedimentation pond to grade with clean fill;
- Consolidating any contaminated surface soils and sediments, including landfill waste, from the east ditch to beneath the existing landfill cap;
- Regarding the south ditch to retain existing stormwater capacity;
- Retrofitting existing monitoring wells;
- Preparing the existing landfill surface in order to provide a foundation for the new cap, as well as removing existing vegetation from the landfill surface;
- Regarding the site to promote runoff;
- Installing a passive gas management system;
- Implementing a long-term groundwater monitoring program to ensure the effectiveness of the remedial action;
- Placing a vegetative cover over the surface of the landfill;

Installing a fence;

- Using institutional controls, including deed restrictions, to limit land and groundwater use;
- Establishing a monitoring plan for cap integrity and fence inspection, and landfill gas migration.

Construction in accordance with this remedy is underway and is expected to be completed in the Fall of 1997. A pre-final inspection is scheduled for September 29, 1997 at which time the agency will inspect the completed construction.

#### **IX. SUMMARY OF SITE HEALTH RISKS AND ENVIRONMENTAL IMPACTS**

As part of the J&L Landfill site investigation, U.S. EPA conducted a Human Health Risk Assessment to determine if contamination from the landfill could pose a present or future risk to human health. CERCLA, 42

U.S.C. § 9601 et seq., requires that U.S. EPA protect human health and the environment from current and potential exposure to releases of hazardous substances at or from the site. This assessment was prepared in a manner consistent with U.S. EPA policy, as expressed in "Role of the Baseline Risk Assessment in Superfund Remedy Selection Decisions," dated April 22, 1991. The study compared contaminant levels detected at the landfill with Michigan and federal standards, considered the manners in which people could be exposed to these contaminants, and estimated whether these contaminants could pose a threat to human health. The potential risks to human health were calculated based on the assumption that no future remedial actions would be taken at the site.

#### A. Identification of Chemicals of Potential Concern

The purpose of selecting chemicals of potential concern (COPC) for the risk assessment is to identify those chemicals present at the site most likely to be of concern to human health and the environment. In general, a chemical was considered as a COPC in the risk assessment if:

- The chemical was determined not to be an artifact of sampling and/or laboratory analysis during data validation;
- The maximum detected concentration exceeded published risk-based screening concentrations, i.e., MDEQ Generic Residential Groundwater Cleanup Objectives (MDEQ, 1996) and U.S. EPA Region III Risk-Based Concentrations (U.S. EPA, 1996);
- The frequency of detection was greater than 5 percent.

Monitoring well and GeoProbe data were screened separately because of differences in sampling technique and sampling locations (on-site, upgradient, and downgradient). The COPCs in groundwater are:

Monitoring Wells	GeoProbe
Acetone	Acetone
Benzene	Benzene
2-Butanone	Chlorobenzene
Toluene	Ethylbenzene
Bis(2-ethylhexyl)phthalate	Xylene
1,4-Dichlorobenzene	1,4-Dichlorobenzene
4-Methyl phenol	4-Methyl phenol
alpha-Chlordane	alpha-Chlordane
4,4'-DDT	4,4'-DDT
Aluminum	Naphthalene
Antimony	Heptachlor epoxide
Barium	4,4'-DDE
Beryllium	Antimony
Cadmium	Arsenic
Chromium	Barium
Iron	Cadmium
Lead	Chromium
Manganese	Iron
Nickel	Lead
Sodium	Magnesium
Thallium	Manganese
Zinc	Nickel
Cyanide	Sodium
	Vanadium
	Zinc

#### B. Exposure Assessment

The objectives of the exposure assessment are to identify actual and potential exposure pathways, and to characterize potentially exposed populations at the site, and to determine the extent of exposure. There are two scenarios to consider for an exposure assessment. The first is a current use scenario and the second is a reasonable future use scenario. In order to complete an exposure assessment, the exposure pathways must be identified. An exposure pathway must include the following four elements: 1. a source and mechanism of chemical release to the environment; 2. a transport media (e.g. groundwater); 3. an exposure point; and 4. an exposure route such as ingestion or inhalation at the contact point. In summary, the exposure assessment is a review of how contamination may come in contact with living organisms via groundwater.

Most residences within a mile downgradient of the site are hooked up to a municipal water supply. A residential water use survey (November 1996) found three residences within one mile downgradient that have private wells presumably set in the shallow aquifer (well depths were unknown for two of these three wells). The remaining residences surveyed either receive municipal water or their wells are set in the deeper aquifer.

The shallow groundwater at the JLLF and the adjacent Sandfill Landfills and the Kingston Development site is not presently used as a potable water supply. This use is extremely unlikely to occur in the future since deed restrictions are in place for the JLLF site as a result of the OUI ROD. Therefore, this exposure pathway is considered not to be complete. This pathway is included in the baseline risk assessment as part of a conservative approach to evaluate exposure in the event of future use of shallow groundwater should deed restrictions fail.

Groundwater may also be used for nonpotable purposes. The use of groundwater for showering or other general washing and bathing activities may result in inhalation of COPCs released as vapors. This may be especially significant for VOCs. In addition, these same activities result in whole or partial contact with the impacted water, potentially resulting in absorption of COPCs through the skin. Daily derma? exposure during showering or bathing is chosen to be representative of all dermal exposure (e.g., washing hands, dishes, cars) because it includes activities that people can be assumed to engage in throughout the year and because it involves whole body contact with impacted water.

#### C. Toxicity Assessment

In evaluating potential health risks, both carcinogenic and noncarcinogenic health effects must be considered. Excessive exposures to any pollutant can potentially produce noncarcinogenic health effects, while the potential for carcinogenic effects is limited to exposure to certain substances. Existing health criteria developed by the U.S. EPA were obtained from the Integrated Risk Information System (IRIS) database or the Health Effects Assessment Summary Tables (HEAST) documents. Values developed by the Environment Criteria and Assessment Office (ECAO; as presented in U.S. EPA, 1996) were used for several chemicals. The carcinogenic and noncarcinogenic toxicity criteria used in this risk assessment are provided in Tables 4-1 and 4-2, respectively, in the Baseline Risk Assessment Addendum (28 July 1997).

Although total chromium was measured at this site, no RfD is available for total chromium. Rather, two different RfDs have been determined for trivalent chromium and hexavalent chromium. For this risk assessment, it was assumed that 90 percent of the total chromium at the site is trivalent chromium and that 10 percent is hexavalent chromium.

#### D. Risk Characterization

Human health risks for carcinogenic and noncarcinogenic contaminants are discussed separately because of the different toxicological endpoints and the different methods employed in characterizing risk. Incidental human health risks associated with exposure to carcinogenic contaminants are calculated by multiplying exposure levels for each contaminant by multiplying exposure levels for each contaminant by corresponding cancer slope factors. The total combined cancer risk is then estimated by summing the risk estimates derived for each compound. This approach is in accordance with U.S. EPA guidelines on chemical mixtures, in which risks associated with carcinogens are considered additive (U.S. EPA, 1986). This approach also assumes independence of action by the contaminants (i.e., that there are no synergistic (positive) or antagonistic (negative) interactions between contaminants) and that all of the chemicals have the same toxicological endpoint (cancer).

When considering potential health risks, U.S. EPA examines two factors--the risk of contaminants causing cancer, and the risk of contaminants causing other ailments, such as respiratory, heart, or nervous system disorders. According to the NCP, U.S. EPA's general cleanup policy under Superfund indicates that when the cancer risk falls between one additional cancer case in every 10,000 people and one additional cancer case in 1 million people, action may be necessary depending on site-specific factors such as location and environmental impact. If the risk is less than one additional cancer case in 1 million, action is generally not required unless there is an unacceptable "non-carcinogenic" or environmental risk.

When calculating non-cancer risk, U.S. EPA uses a hazard index (HI) for both short-term (subchronic) exposures and long-term (chronic) exposures. An HI of greater than 1.0 indicates a potential for adverse health effects due to exposure to toxic compounds and is also considered an unacceptable risk level which requires action.

Cancer risk associated with the future potential on-site residential scenario exceed the 1 in one million point of departure for ingestion, inhalation, and dermal absorption of groundwater, and for ingestion and dermal absorption of soil. Non-cancer risks associated with the future on-site residential use of groundwater as a potable water supply also exceed acceptable levels (HI greater than 1), and are primarily due to arsenic.

Residential and industrial use of groundwater under the JLLF site were considered in this evaluation. Total cancer risk and total noncarcinogenic health effects are presented in Table IX-1. Under an on-site residential scenario, total cancer risks ranged from  $2\text{E-}04$  to  $6\text{E-}04$ , and the total noncarcinogenic hazard index ranged from 12 for an adult to 28 for a child. Under an on-site industrial land use, total cancer risk ranged from  $3\text{E-}05$  to  $1\text{E-}04$ , and the total noncarcinogenic hazard index ranged from 2 to 4.

Table IX-1  
Re-evaluation of On-Site Groundwater Risks  
JLLF

Exposure Route	On-Site Residential			On-Site Industrial	
	Cancer Risk	Hazard Index		Cancer Risk	Hazard Index
		Adult	Child		
	Representative Average Exposure (RAE)				
Ingestion	2E-04	12	28	3E-05	2
Dermal Contact	1E-12	0.02	0.04	1E-07	0.01
Inhalation	1E-05	0.02	0.1	1E-06	0.01
TOTAL:	2E-04	12	28	3E-05	2
	Reasonable Maximum Exposure (RME)				
Ingestion	6E-04	12	28	1E-04	4
Dermal Contact	2E-06	0.04	0.07	1E-06	0.03
Inhalation	2E-05	0.02	0.1	7E-06	0.01
TOTAL:	6E-04	12	28	1E-04	4

With the exception of arsenic, these risks fall within the range of acceptable cancer risk. Excess cancer risks in the range from 1E-04 to 1E-06 may not be considered acceptable depending on site-specific factors. In an April 1991 memorandum (OSWER Directive 9355.0-30), the U.S. EPA further clarified the acceptable carcinogenic risk range by stating that when reasonable maximum exposures for both current and future land use are less than 10<sup>-4</sup>, action is generally not warranted.

The Baseline Risk Assessment reinforces the existence of a potential threat to public health, welfare or the environment. Actual or threatened releases of hazardous substances from this site, if not addressed by implementing the response action selected in this ROD, may present an imminent and substantial endangerment to public health, welfare, or the environment.

#### E. Uncertainties

Understanding the uncertainty associated with these risks estimates is an important point that is vital to their proper interpretation. A major source of uncertainty associated with this risk assessment is the assumption of future residential use of groundwater from under the JLLF site. The site is a former landfill. It is extremely unlikely that residences will be built on this site and that a private well will be developed in the shallow groundwater beneath the landfill. Deed restrictions are in place as a result of the ROD for OU1; thus groundwater use at the JLLF is not a complete exposure pathway. The risk analysis was performed to evaluate the potential for exposure should deed restrictions fail at some time in the future.

There is also uncertainty in the risk estimates for ingestion of inorganic arsenic. A memorandum from the U.S. EPA Administrator (as described in IRIS) counsels that "the uncertainties associated with ingested inorganic arsenic are such that estimates could be modified downward as much as an order of magnitude

relative to the risk estimates associated with most other carcinogens." Thus, risks associated with exposure to arsenic may be overestimated by an order of magnitude, resulting in a risk estimate that is within the range of acceptable risks. In addition, the 95% UCL concentration of arsenic (24.8 ug/L) does not exceed its MDNR Generic Residential Groundwater Cleanup Objective (50 ug/L).

The site-wide average and maximum concentrations of beryllium (0.503 ug/L and 0.59 ug/L, respectively) does not exceed its MDNR Generic Residential Groundwater Cleanup Objective (4 ug/L). The maximum concentration of 1,4-dichlorobenzene (5 ug/L) does not exceed its MDNR Generic Residential Groundwater Cleanup Objective (50 ug/L) and the site-wide concentration of bis(2-ethylhexyl)phthalate does not exceed its MDNR Generic Residential Groundwater Cleanup Objective (6 ug/L).

Another source of uncertainty is the toxicity value used to evaluate iron. There is no U.S. EPA-established toxicity value for iron. An EPA-NCEA Regional Support provisional value presented in the U.S. EPA Region 3 Risk-Based Concentration table was used. The 95% UCL concentration of iron (81,000 ug/L) exceeds the MDNR Generic Residential Groundwater Cleanup Objective (300 ug/L) for this metal. It should be noted that the drinking water standard for iron is based on organoleptic properties (e.g., taste, odor, color, and non-aesthetic effects), rather than health effects. In addition, iron is known to naturally occur at elevated levels in this area.